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THE  
TOPOGRAPHICAL SECTION  
GENERAL TRAVEL  
IN ACCORDANCE WITH  
MOUNTAIN TRAILS

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THE  
TOPOGRAPHICAL SECTION  
OF THE  
GENERAL STAFF:

WITH AN ACCOUNT OF THE GEOGRAPHICAL SERVICES OF THE  
AUSTRIAN, FRENCH, GERMAN, AND RUSSIAN, ARMIES.

*Written by direction of Maj.-Gen. J. M. Grierson, C.V.O., C.B., C.M.G.,  
Director of Military Operations,*

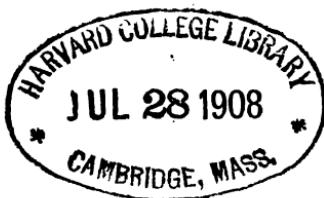
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BY  
CAPTAIN G. R. FRITH, R.E.,  
STAFF CAPTAIN, TOPOGRAPHICAL SECTION, G.S.

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**Ghathjam:**  
PRINTED AT THE SCHOOL OF MILITARY ENGINEERING.  
1906

War 759.06



Major L. F. Glasc, R. S.  
War Office.

## GREAT BRITAIN.

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### Topographical Section of the General Staff.

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In tracing the history of the origin and development of the Department, now designated the Topographical Section of the General Staff, it is necessary to follow somewhat closely that of the Ordnance Survey, especially in its earlier stages. One is the complement of the other; and the Topographical Section may be regarded as derived from the Ordnance Survey, though it was not formed directly from it, and in the first years of its existence had no connection with it. In continental armies the Topographical Sections of the Staff are responsible for the work, which in Great Britain is divided between the Ordnance Survey and the Topographical Section of the General Staff. The military side of the Ordnance Survey is apt to be lost sight of to-day, placed as it is under a civil Department of State, and a major portion of its work being cadastral, rather than military. Its establishment was due to the need felt for an accurate map of the country for purposes of defence; and for upwards of 70 years it remained under the War Department, at one period being actually combined with the Topographical Section. When by the establishment of the Ordnance Survey, the provision of an accurate military map of the British Isles had been assured, an extension of the existing department, or the formation of a new one, which should devote itself to the collection of geographical and topographical information about the Colonies and foreign countries, would seem a logical sequel in a country with such vast oversea interests as Great Britain. Logic, however, has an unfortunate faculty of appearing illogical when the conclusion to which it points necessitates the expenditure of money. A branch of the Quartermaster-General's department, formed in 1803, seemed to

promise to develop into such a department, but, either because it came into existence before the need of such a branch was fully recognized, or because the lines on which it was organized were defective, probably from both causes, it never developed, and, though lingering on as an appanage of the Quartermaster-General's Department till absorbed by the newly-formed Topographical and Statistical Department in 1857, it appears to have done little in the direction of collecting information, either topographical or otherwise. Not till 1855 was the department formed, of which the present Directorate of Military Operations is the outcome.

After the rebellion of 1745 had been finally crushed at Culloden, and military posts established throughout the Highlands, Lieut-General Watson, at that time (1747) Deputy Quartermaster-General in North Britain, recognizing the necessity of having a good map of a wild and rugged region, which had so lately been the scene of military operations, and might be so again, directed Maj.-General Roy, R.E., then Deputy Assistant Quartermaster-General, to undertake the task.

This survey, which was afterwards extended to the Lowlands of Scotland, was not based on any great triangulation; but was more of the nature of a "magnificent military sketch" to quote General Roy's own description of his work. The map was never completed, or published, the outbreak of the Seven Years' War in 1756 necessitating the employment elsewhere of the Officers engaged upon it.

Although never completed, this survey is important as being the first large military survey undertaken in Great Britain and the forerunner of the Ordnance Survey. In that it marked an official recognition of the necessity of preparing maps of possible theatres of military operations, it may be regarded as the germ of an idea which more than a century later developed into a Military Topographical Department.

On the conclusion of peace in 1763 the question of undertaking a Topographical Survey of the whole of Great Britain came for the first time under the consideration of the Government. General Roy, who was to be placed in charge of the work, proposed to utilize the topographical work already executed in Scotland, for filling in

the detail of the trigonometrical survey in that part. Again war postponed the work, the outbreak of the American Revolution in 1776 turning the attention of the authorities in another direction.

With the advent of peace in 1783, General Roy thought the time favourable to bring forward once more the question of a national survey. Finding himself detained in London during the summer of that year he conceived the idea of making a small trigonometrical survey of the immediate neighbourhood of the capital; such a survey would not only be of scientific value by connecting the several observatories in and around London, but would, he hoped, arouse public interest, and lead to a revival of the scheme of 1763.

As the foundation for his proposed survey General Roy measured a base of 7744·3 feet across the fields between the Jews Harp near Marylebone, and Black Lane near Pancras.

This instance of individual effort towards the commencement of a national survey was paralleled many years later when Major Jervis, in furtherance of his scheme for the establishment of a Topographical Department, reproduced, at his own expense, maps of the Crimea for use in the war which had just broken out.

General Roy's efforts were to be seconded from a totally unexpected quarter. In October 1783 Comte d' Adhemar, then French Ambassador to the Court of St. James, transmitted to Mr. Fox, at that time Foreign Secretary, a memoir by M. Cassini de Thury, in which the latter showed the great benefit which would accrue to astronomy, by carrying a series of triangles from London to Dover, and connecting them with those already executed in France, thus determining accurately the relative positions of the observatories of Greenwich and Paris. This proposal was communicated to the Royal Society, and, being warmly taken up by them, with the approval and financial assistance of the King, the task was entrusted to General Roy to carry out.

On the 16th of April, 1784, General Roy, accompanied by Sir Joseph Banks, President of the Royal Society, Mr. Cavendish, and Dr. Blagden, began operations for measuring a base on Hounslow Heath. The measurement of this base line may be called the

commencement of the Ordnance Survey of Great Britain ; though not till 1791, on the initiative of the Duke of Richmond, then Master General of the Ordnance, was the order given for a survey of the whole country to be commenced, for the purpose of producing a military map of the United Kingdom.

The establishment of a national survey having ensured the provision, both for military and civil purposes, of accurate maps of the United Kingdom, an extension of the geographical service to include the Colonies and foreign countries was the next requirement. In 1803 the value of a department which should collect information, both topographical and statistical, not only about Great Britain and her Colonies, but about foreign countries, appears to have been realized by the authorities. With whom the idea for the formation of such a department originated is difficult to trace, nor are the functions which it was intended to fulfil, or the work which it actually did, quite clear.

The department which enjoyed the quaint title of Depôt (or Deposit) of Military Knowledge was a branch of the Quarter-master-General's department. In a letter from the Duke of York, then Commander-in-Chief, dated 3rd August, 1805, it is stated that the formation of such a department was authorized by the Government in April, 1803.

The general principles on which the establishment was formed were detailed in a memorandum sent to Mr. Pitt by the Commander-in-Chief in 1804, this unfortunately is not obtainable, but the covering letter gives a general idea of the proposed organization of the department, and is as follows:-

“ Horse Guards,

28th June, 1804.

SIR,

I request to call your attention to some circumstances which are essential to the formation of a deposit for military knowledge, which was last year authorized to be formed under the Q.M.G. by His Majesty's Government.

It was proposed that this establishment should be classed under three heads :—

1. A military library.
2. A drawing room for copying plans and containing a collection of the best plans and maps.
3. A deposit of all military information which could be collected from the manuscripts of Officers who now occupy, or may formerly have held staff situations ; or who may have been employed upon foreign service.

\* \* \* \* \*

I am further to recommend the propriety of two additional clerks, and also two regular draftsmen, being granted solely for the duties of this branch of the department, it having been found (from the great pressure of business) impossible to apply the clerks now in the office to any purpose beyond the daily correspondence and detail.

The circumstances of this undertaking having been entered upon at the beginning of a war has retarded its progress, the more urgent claim of public service having called for the attention of the Officers intended to conduct it.

A beginning has however been made, and books and maps to the value of betwixt £400 and £500 collected :—

\* \* \* \* \*

I am, SIR,

Yours,

(Sd.) FREDERICK."

From a letter of the Duke's dated August 3rd, 1805, to Viscount Castlereagh, it appears that the office was divided into two branches, each under an "Officer of approved knowledge," one to have charge of the plans and maps and direct the drawing room, the other to have the direction of the manuscripts and library.

In addition two D.A.Q.M.G.'s. were to be appointed to aid these Officers.

The work of the newly formed department was not only retarded by the necessity of employing the Officers comprising its staff upon more urgent work, occasioned by the re-commencement of the war, but also by the lack of sufficient office accommodation ; to remedy the latter difficulty an additional story was added to part of the Horse Guards, which work appears to have been completed by the end of 1805.

In the Commander-in-Chief's letter to Viscount Castlereagh he estimates the cost of establishing the department at £5000, of which however only £2000 was immediately required. This sum appears to have been intended merely for the purchase of books and maps, the pay of the staff being additional. The department, though under the Q.M.G., was quite distinct, a separate estimate being submitted for its expenses. In the same letter sanction for the employment of two draftsmen is asked for, it having been found necessary to do without one D.A.Q.M.G. in order to provide funds for the payment of draftsmen. Money for the pay of two clerks is also asked for; one of whom was to be conversant with foreign languages (at 7s. 6d. per day). The staff thus consisted of four officers, two draftsmen and two clerks.

There seems to have been no co-ordination between the Depôt of Military Knowledge and the Ordnance Survey, for in 1805 the sum of £178 is asked for to defray the expense of engraving a skeleton map of the country between Portsmouth, London, and the Isle of Thanet, work which must have overlapped that being executed by the Ordnance Survey.

The long peace which followed the campaign of 1815, and the general lack of interest in military affairs consequent upon the final defeat of Napoleon, was felt by this embryo Intelligence Branch in common with the other departments of the army ; and the outbreak of the war with Russia found the army quite unprovided with maps of the theatre of operations. The department created in 1803 had become a mere appanage of the Q.M.G.'s department, and the necessity of forming an entirely separate branch was brought home to the authorities through the persistent efforts of Major T. B. Jervis, a retired officer of Engineers.

Major Jervis, who had throughout his service in India been employed on survey work, and had for private reasons refused the appointment of Surveyor General in India, was an enthusiast in everything pertaining to geography and topography. Finding himself at a comparatively early age freed from official trammels, he turned his attention to the advancement of geographical science in England. In 1846 Major Jervis addressed to Lord Aberdeen, then Foreign Secretary, a letter, from which the following is an extract :—

“Great Britain is the only country of note which has no geographer attached to the government, and no national dépôt of geographical maps and plans. The Ordnance Survey is exclusively directed to British territories, the Hydrographic Office to nautical charts. This desideratum has for many years enjoyed my constant and particular attention ; and as such an object, consistently with prudential motives and occasional secrecy, could only be effectively carried out under the Foreign Office, I venture to lay before your Lordship the enclosed memorandum, which may claim your attention with reference to the Oregon Question, Lord Ashburton’s late mission, and the acknowledged want of geographical information in many well known and recent cases ; Borneo and the Eastern Islands, the Russian proceedings in Persia and Syria; the affairs in China; in respect also of South America. In the necessity that has hitherto existed of dependence on chance, or private aid, any great degree of secrecy or accuracy is not to be expected.

The want of such a dépôt has long been felt, and frequently adverted to in Parliament and by the public. It can now be supplied, and would form, in conjunction with the departments above named, a complete system of record.”

This memo was acknowledged with thanks, but the stress of war was necessary to bring home to the Government the importance of a properly organized topographical department.

In 1854 at the outbreak of the Crimean War, Major Jervis was in Belgium, and while there was fortunate enough to obtain copies of the Russian General Staff Map of the Crimea and the Austrian Military Map of Turkey in Europe, both very rare maps

as they were jealously guarded by the respective War Offices. On the declaration of war Major Jervis, who had already transliterated and translated the Russian one, hurried home and laid his maps before the Secretary of State for War, the Duke of Newcastle, pressing the government to authorize him to reproduce the maps for use in the Crimea. Although vastly superior to the maps it was proposed to use, there was no precedent for such an expenditure as the reproduction of the maps would entail, and Major Jervis was informed that his proposal could not be entertained; if, however, he would reproduce the maps at his own cost the Government would purchase as many copies as they might think desirable.

Undismayed by this rebuff Major Jervis determined to reproduce the maps at his own expense; taking an office in Adelphi Terrace, so expeditiously did he work, that an English edition of the map of the Crimea, in ten sheets, printed by chromo-lithography in blue, black, and brown, was in the hands of the Headquarter Staff before they landed in the country. At first the government purchased but few; the map however was found so invaluable at the seat of war that large numbers were eventually bought.

Throughout the year 1854 Major Jervis continued to press on the government the importance of instituting a Topographical Department, and at last, on the 2nd February, 1855, was rewarded by receiving a letter from Lord Panmure, Secretary-at-War, communicating to him the sanction of the Treasury for the creation of a Topographical and Statistical Department in connection with the War Office, and offering to him its superintendence. This letter is of sufficient interest to quote in full:—

“ War Department,  
Feb. 2nd, 1855.

SIR,

With reference to your letters of December 1st and January 9th, I am directed by Lord Panmure to acquaint you, that My

Lords of the Treasury have given their sanction to the creation of a Statistical and Topographical Office in connection with the War Department, and the pay of a salary to the Officer charged with its superintendence. Lord Panmure entirely concurs with the opinion recorded by his Grace the Duke of Newcastle, that your varied attainments, and the great attention you have paid to geographical science during many years are valuable qualifications for the office in question, and I am directed to propose to you its acceptance.

In the event of this offer meeting your views, you will be charged with further arrangements for consolidating, as far as possible, in this department the various scattered collections of military plans, maps, books, and documents, that other departments of the public service hold in charge, so far as such consolidation is desirable for convenience of access and arrangement.

It is also Lord Panmure's intention to unite in the same establishment, as soon as it can be conveniently effected, the Topographical Department now under the Horse Guards. Temporary arrangements are now completed for the reception of the collection about to be formed. You are requested to transfer to it at your earliest convenience the maps and plans which Marshal Vaillant and Admiral Ducos charged you to present to the Duke of Newcastle.

I am, Sir,

Your obedient servant,

(Sd.). J. PEEL.

Major T. B. Jervis."

The department was first housed in a building in Whitehall, stated to have consisted mainly of a coach house and stables, and at 9, Adelphi Terrace. Subsequently, August 1st, 1856, it was moved to 4, New Street, Spring Gardens.

In a memorandum furnished to the War Department in 1855, Lieut.-Colonel Jervis gives his ideas as to the work which the Topographical and Statistical Department should perform; briefly these are:—

1st—Compilation and printing of all maps required for military and political purposes. Collection of maps published at home and abroad, and of topographical and statistical information about the Colonies and foreign countries.

2nd—To afford facilities for a limited number of officers from all arms of the service to become acquainted with the methods employed in making and reproducing maps, and to acquire information both topographical and statistical about other countries.

3rd—To carry on geographical and statistical researches in other countries.

To carry out this last he proposed to have attached to the department, and under the orders of its director, a small number of highly trained officers and subordinates who should be constantly employed, in parties not exceeding six, in making maps of, and collecting information about, countries of which it might be considered desirable to gain accurate knowledge.

When the Topographical and Statistical Department was formed it was the intention that it should absorb the Topographical Dépôt of the Q.M.G.'s Department (the old Dépôt of Military Knowledge), and also the Survey Branch of the Inspector General of Fortification's Department ; this was not, however, carried out till the end of 1857.

In August 1855, there were employed in the department 26 engravers, lithographers, and assistants, including one clerk ; and in the following year, when the department moved to Spring Gardens, the amount taken in the estimates for it was £5,000. In this year it was decided by Lord Panmure that the duties of the department should embrace the acquisition of plans of all the barracks and forts in the British Dominions. On April 3rd, 1857, Colonel Jervis died, and shortly afterwards a committee was appointed by Lord Panmure to "investigate and report on the Topographical and Statistical Department."

The work executed in the department during Colonel Jervis' directorship included :—

A Map of the Black and Caspian Seas.

Map of the Principal Military Communications of the Caucasus and Contiguous Provinces.

Maps of Khiva, the Sea of Aral and the country between the Caspian and Herat.

Historical Treaty Map of Europe.

Also plans of fortresses such as Sebastopol, Silistria, and Erzerum.

There was also on the staff of the department an artist who made several large views which were lithographed and sold to the public, among these were:—

“A General View of Kars,” “View of the Battle of Balaclava,” “View of the Docks of Sebastopol,” etc.

The idea of producing work of this kind was taken from the Dépôt de la Guerre in Paris.

The Committee appointed by Lord Panmure to report upon the Topographical and Statistical Department consisted of Mr. T. R. Godley, Assistant Under Secretary of State, General H. R. Storks, Secretary for Military Correspondence, Mr. R. C. Kirby, Accountant General, and General T. H. Lefroy, Director General of Military Education.

Pending their report Captain Cameron, R.E., Executive Officer, Ordnance Survey, was placed in temporary charge of the department.

On the 18th July, 1857, the Committee submitted its report:—

It stated that notwithstanding the zeal and ability displayed by Colonel Jervis, the value of the work was not proportionate to the cost, and the selection of work not always judicious. These results it considered due to the department being organized in a hurry and under severe pressure, and to the absence of definite instructions. The department, as has been seen, was started just after the outbreak of the Crimean War. The Committee further pointed out that there were at the time of their report, three separate and independent establishments in connection with the War Office engaged in Topographical work, viz.:—

1. The Topographical Dépôt of the Quartermaster-General's Department.

2. The Survey Branch of the Inspector-General of Fortifications Department.

3. The Topographical Department.

This the Committee considered an anomalous arrangement, and recommended that, as in France, Russia, and the United States, there should be a department of government for procuring topographical, and statistical information, in which should be amalgamated these three offices ; all maps and documents should be collected, and to this department should be sent military dispatches, reports of reconnaissances, etc.

The Committee recommended that the Officers of the department should be selected from as wide a field as possible, and that the Topographical Department should be independent of the office of the Inspector-General of Fortifications. It considered that the department should be an independent branch of the War Office, and that the Secretary of State be empowered to employ officers and men from any branch of the British or Indian Armies or from civil life. The Committee further considered that the Ordnance Survey should be under the immediate direction of the Assistant Director in the Topographical Department controlled by the Head of the Department in London.

In consequence of this report Lord Panmure ordered the following arrangements to be carried out :—

1. Lieut.-Colonel James, R.E., to be Director of the Topographical and Statistical Branch of the War Office, to include the Ordnance Survey.

2. The existing Topographical Department in Spring Gardens, the Ordnance Survey, and the Quartermaster General's Topographical Dépôt to be united.

3. Appointment of four officers, additional to those of the Survey Department, to be selected from Cavalry, Artillery, Engineers and Infantry.

4. Pay to be £1,200 per annum for the Director, and for the other officers twice and one half the regimental pay of their rank, in lieu of all military pay and allowances.

5. A quarterly return of progress made, to be rendered.
6. Early attention to be paid to the study of colonial military resources.

Lord Panmure's instructions with regard to Colonial Surveys are of particular interest at the present time, when renewed efforts are being made to establish close relations with the Topographical Departments of the self-governing colonies, and to co-ordinate the various surveys of the Crown Colonies and Dependencies. In his letter of instructions to Colonel James, he said, "Lord Panmure is desirous that you direct an early attention to the subject of Colonial Surveys, ascertaining as far as possible what works of this nature are in progress at the expense of Colonial Legislatures, and reporting whether it may not be possible to establish a system under which your department, with the concurrence of the Secretary of State for the Colonies, may assist in their systematic prosecution, his Lordship being satisfied that, whether from a military, a scientific, or a national point of view, it is of much importance to bring all the Topographical operations of the British Colonies into harmony with one another, and to collect all information respecting them at a central establishment accessible to government."

It was laid down that the Officers of the department should be appointed on probation for a period of twelve months, and, if found suitable, they were then to be appointed permanently for a period of three years.

Subsequent to this report Major Elphinstone, V.C., R.E., was appointed to assist Colonel James as executive officer.

In April 1858 the old Dépôt of Military Knowledge, established in 1803, which later had been known as the Topographical Dépôt of the Quartermaster-General's Department, was amalgamated with the Topographical and Statistical Branch.

In January 1859 Major Elphinstone was succeeded by Major Cooke, R.E., and in March of the same year Captain Petrie of the 14th Regiment was appointed to the Department, in pursuance of Lord Panmure's decision to have each branch of the service represented.

In 1865 the Department was again subjected to the scrutiny of a Committee, consisting of:—

Sir Richard Airey, K.C.B., Q.M.G.,  
 Colonel Chapman, C.B., D.A.G., R.E.,  
 Captain Galton, R.E., Asst. U.S.S. for War.

They were directed to enquire into the Topographical Department, especially with reference to the desirability of separating the Ordnance Survey from the Topographical Depôt. This committee recommended that no change should be made in the organization of the department as sanctioned by Lord Panmure on the recommendation of the Committee of 1857. They considered, however, that there was a want of special supervision over the work done, and recommended:—

1. That requisitions for military service should pass through the Quartermaster-General.
2. That the sale of Ordnance maps should be transferred from the Topographical Depôt to two or four publishers in London.

The Secretary of State approved these conclusions, but reserved to himself the right of ordering any services he might think fit, without reference to the Horse Guards.

In November of the same year, the necessity for extending the Topographical Department was discussed, and a project for its further development was laid before the War Office by Sir H. James, after approval had been given by His Royal Highness the Field Marshal Commanding-in-Chief and by Sir John Burgoyne.

On the 1st April, 1870, the Ordnance Survey was transferred from the War Office to the Office of Works, and in May, 1870, Captain Wilson, R.E., who had been executive Officer under Colonel James, was appointed Director of the Topographical and Statistical Department. The reasons, however, which led to the severance of the Ordnance Survey from the Topographical and Statistical Department appear to have been financial, and not difficulties of organization. The military map of England and Wales being complete, it was not considered right that the cost of the Cadastral Survey should fall on the War Office vote.

During the directorship of Sir Henry James, a survey of Jerusalem and Sinai was carried out. This work was executed under the Ordnance Survey, and not, as would have been expected, by the Topographical Department.

It will thus be noted that for a period of 13 years (1857-1870) the two departments were under one director, an arrangement which enabled the Topographical Department to utilize the resources of the Ordnance Survey and thereby effect a reduction in its own staff of draughtsmen and lithographers. A somewhat similar arrangement, so far as concerns utilizing the Ordnance Survey resources, still obtains, and tends greatly to relieve the strain on the Topographical Section under any sudden pressure of work.

During the period 26th October, 1857, to 31st March, 1870, there were printed by the Ordnance Survey for the Topographical Section, 1097 separate maps and plans, amounting in all to 237,519 impressions.

On the 1st April, 1870, when the Ordnance Survey was transferred from the War Office to the Office of Works, the Topographical Department consisted of but one Officer, Lieutenant Baring, R.A., (now Lord Cromer), in addition to the executive Officer, Captain Wilson, R.E., the subordinate staff numbering 13 civil assistants and draughtsmen, 4 labourers and 1 military clerk.

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#### 1870.

The condition of the department at this time was not satisfactory. Besides the want of information about foreign armies the library and map collections were deficient. Reports from Military Attachés were seldom received. Officers were not sent officially to the Continent, and there was no information about the Colonies. The Department was really in a transition stage, the statistical part was increasing in importance, and the whole branch needed re-organization.

On the 30th April, 1870, Captain Wilson submitted to Sir E. Lugard a memorandum on the state of the Department and the duties it ought to perform.

The topographical work was apparently hampered by insufficient funds being allotted for the purchase of maps, and further the recommendation of the committee of 1857 that "all maps now lying scattered throughout the offices of the Inspector-General of Fortifications and the Quartermaster-General should be added to the collection of the Topographical Depôt" had not been carried out. There were apparently some 4,000 maps in the Director of Works Department alone, most of which were of a purely topographical character, embracing nearly every country in the world. The Statistical Branch of the Depôt also suffered from neglect. The whole department does not appear to have been taken seriously at this time, and would seem to have been regarded merely as an ornament which an army must have if it wished to be regarded as up-to-date. Captain Wilson complained that when information on foreign statistics was required by the Secretaries of State or the heads of departments in the War Office, application was seldom made to the Topographical Depôt, the natural result of this was that officers gradually lost interest in their work. In the same report Captain Wilson suggested that the War Office Library should be placed in charge of the Topographical Depôt.

When the war of 1870 broke out and the government was in need of information about continental armies, it was apparent that a re-organization of the Department was urgently required, and Captain Wilson prepared a scheme for this purpose in August, 1870. It is significant testimony to the practical value of such a department that its formation in 1855, its re-organization in 1871, and the large increase in its staff in 1904, should in each case have been brought about by war and the need, actually experienced, of information such as the Department, properly organized and staffed, would supply.

Captain Wilson's scheme which was practically adopted in its entirety by the Committee and submitted to the Secretary of State for War, was briefly:—

The Department to be divided into two Sections under one Director—a Topographical Section and a Statistical Section. The duties of these two Sections to be:—

### TOPOGRAPHICAL SECTION.

- I. Collection of Maps.
- II. Production of Maps.
- I. Collection of maps.—A collection to be formed of :—
  - (a) The best maps extant of Great Britain and Ireland, the Colonies, and all foreign countries.
  - (b) Plans of foreign fortresses.
  - (c) Maps and plans illustrative of campaigns, battles, sieges, etc.
  - (d) Photographs.—These to be procured by purchase, exchange, and by encouraging Officers who travel to send photographs to the Department.
- II. Production of Maps.
  - (a) Compilation of maps for military purposes, as that of Abyssinia, issued before the departure of the Expedition to that country.
  - (b) Copying maps.
  - (c) Lithographing of maps.

### STATISTICAL SECTION.

This Section to be divided into three sub-sections, each presided over by an officer. These sub-sections to be designated Section A, Section B, and Section C, Topographical Department. Each sub-section to have allotted to it a group of countries, about which it would collect information of military value.

A good military library to be formed, which should be placed under the Topographical Department.

This scheme was approved by the Secretary of State for War and the Department was reorganized on these lines.

In 1872 Captain Wilson, at Mr. Cardwell's request, proposed a scheme for an enlargement of the Department. The chief features of the scheme were :—

1. That an Officer of high rank and position should be placed at the head of the Department.
2. That he should have no executive duties.
3. That all candidates for staff employment should pass through the department and thus become personally known to its chief.
4. That the system of working by sections should be retained, but the staff increased.
5. Additional sections to be formed for Home and Colonial defence, railways and telegraphs, and military history.
6. That a military periodical, similar to those published by continental armies, should be issued by the Department.

On the 24th February, 1873, Mr. Cardwell, Secretary of State for War, mentioned the Topographical Department and its Director, in his speech on the Army Estimates, and announced his intention of enlarging it by transforming it into an Intelligence Department with a General Officer at its head.

On the 1st April, 1873, the Intelligence Department was created, and the Topographical Department allied to it, Major General (afterwards Lieutenant General) Sir P. MacDougal being appointed D.A.G., in charge of the combined departments.

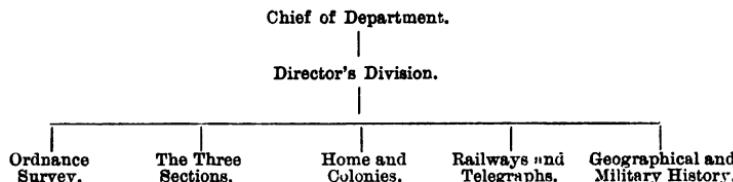
The general scope of the enlarged Department was defined as:—

I. The collection of all statistical and topographical information which it would be useful to possess in the event of invasion or foreign war.

II. The application of such information, in respect to the measures, considered and determined on during peace, which should be adopted in war, so that no delay might arise from uncertainty and hesitation.

With the creation of the Intelligence Department, the separate existence of the Topographical Section ceased, and henceforth it constituted one of the branches of the department which had been evolved from it.

On the 2nd October, 1873, Major Wilson submitted to General MacDougal a scheme for a further enlargement of the Department, which contemplated bringing the Ordnance Survey again under the chief of the Intelligence Department. The suggested organization was as follows:—



The distribution of duties to be:—

**Director's Division.**—Charge of all correspondence, distribution of work, registry of papers, and parliamentary work.

**Ordnance Survey**, with a Colonel as Director of Surveys:—All Survey work in Great Britain and Ireland.

**The Three Sections.**—Collection of military statistics about foreign countries.

**Home and Colonies.**—Collection of military statistics relating to the United Kingdom and the Colonies; schemes of defence, etc.

**Railways and Telegraphs.**—Collection of statistics, and information concerning the railways of the United Kingdom, the Colonies, and foreign countries.

**Geographical and Military History.**—Charge of the map room, library, and military archives; compilation of new maps, issue of geographical and topographical notices; urgent lithographic work, and the compilation of official accounts of wars and expeditions.

A field Officer to be at the head of each division as divisional chief, and the number of Officers in each division (except the Ordnance Survey) to be five or six, or a total establishment of—

1 General Officer, Chief of Department.

1 Colonel, Director of Surveys.

**5 Field Officers, Divisional Chiefs.**

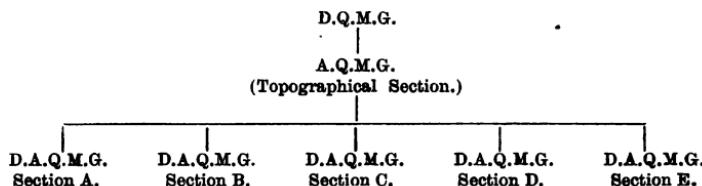
**25 or 30 Captains and Subalterns for the five divisions,  
with clerks, draughtsmen, etc.**

If the Ordnance Survey was to be brought under the Chief of the Intelligence Department, the formation of a second section for cartographic work, as this scheme contemplated, seems difficult to justify. The scheme was not adopted.

In January, 1874, the Topographical Department was moved from New Street, Spring Gardens, to Adair House, St. James' Square.

On the 22nd July, 1874, the Intelligence Branch was transferred to the Quartermaster-General's Department and Sir Patrick Mac Dougal was appointed D.Q.M.G.

In 1875 the following arrangement and distribution of duties was brought into force.



In addition to directing the Topographical Section and exercising a general supervision over the five statistical sections. the A.Q.M.G. took Central Asia, China, and special subjects, as well as office routine work, registry, and general correspondence. His assistants comprised,

**2 Officers for Central Asia, China, etc.**

**1 Librarian.**

**1 Assistant librarian for the Topographical Section.**

**4 Clerks.**

**5 Draughtsmen.**

**1 Printer.**

**2 Labourers.**

In March, 1876, Major Wilson's period of Staff Service expired and he left the department, being appointed head of the Ordnance Survey in Ireland. He was succeeded by Lieutenant-Colonel Home, R.E.

In October, 1877, a new section, F, was added to the existing five.

In May, 1877, it had been pointed out that the topographical work was so important that it was then executed under the immediate personal direction of the A.Q.M.G., but that the many duties that Officer was charged with did not permit him to give complete attention to this work. It was therefore considered advisable to form another section.

The duties of the Officer in charge of section F comprised—

Charge of Map room and Library.

Superintendence of compilation of maps.

Superintendence of lithographic work.

Issue of maps, plans, books, etc.

Selection of books and maps to be purchased.

Examination of newspapers and periodicals.

The Staff of the Section consisted of:—

1 Officer, D.A.Q.M.G.

An Assistant librarian.

2 Assistants in library.

5 Draughtsmen.

3 Lithographers.

This organization the section maintained till 1900 with little change, except a small increase of staff.

At the end of 1900 the strength of the section was—

1 D.A.Q.M.G.

1 Staff Captain.

1 Attached Officer.

- 2 Clerks.
- 1 Map'mounter.
- 1 Map'curator.
- 1 Assistant map curator.
- 15 Draughtsmen.
- 1 Photographer.
- 3 Printers.
- 1 Stone Grainer.

The duties of Staff Captain and attached Officer being however carried out by one Officer only, between October, 1899, and July, 1902.

In 1894, the library was removed from Section F and constituted a separate section.

In 1901 the whole office was rearranged, and Section F further reduced by being deprived of the custody of maps, its designation being altered to I 3 (b).

In July, 1903, the section was increased by one Staff Captain.

#### REORGANIZATION OF INTELLIGENCE DEPARTMENT, 1904.

In 1904 the Intelligence Department was again reorganized, the designation of the Department being changed to that of Directorate of Military Operations. Under the new system it formed one of the branches of the newly created Department of the Chief of the General Staff, its immediate head being a Major General with the title of Director of Military Operations.

The Directorate is divided into four sections, of which the topographical branch forms the fourth, termed the Topographical Section of the General Staff. Under the reorganization the custody of the collection of maps has reverted to the section.

#### STAFF OF TOPOGRAPHICAL SECTION, 1905.

The present staff of the Topographical Section consists of—

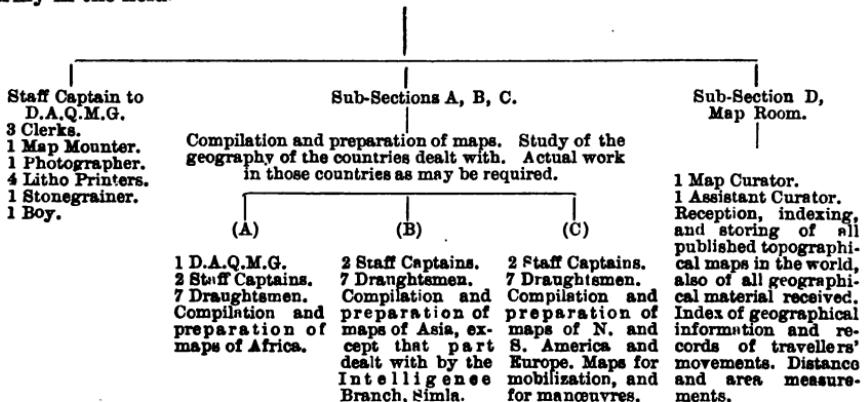
- 1 D.A.Q.M.G. in charge of the Section.
- 1 D.A.Q.M.G.

7 Staff Captains.  
 1 Map curator (civilian).  
 1 Assistant Map curator (civilian).  
 3 Clerks.  
 1 Map mounter.  
 21 Draughtsmen  
 1 Photographer }  
 4 Printers }  
 1 Stone grainer }  
 1 Boy } Civilians.

The organization of the Section is as follows:—

**D.A.Q.M.G.—IN CHARGE OF T.S.G.S.**

Collection of Topographical information, compilation and preparation of all maps for military purposes. Organization of all geographical work for the army. All matters connected with International boundary delimitation and demarcation commissions. Selection of Officers for survey and geographical work. Issue of maps for war. Selection of Officers from the Section or who have served in the Section, for duty as Staff Officers for Topography with an army in the field.



## DUTIES OF THE TOPOGRAPHICAL SECTION OF THE GENERAL STAFF.

Broadly, the functions and duties of the Topographical Section of the General Staff are as follows :—

1. The provision of maps for war. This includes not only the compilation, arrangement, printing, and publication of geographical material in various forms for use by British troops; but it has been recently decided that officers of the section should as far as possible have a personal knowledge of the countries with which they deal, and should themselves, as opportunities offer, take a part in the investigation of geographical problems on the spot.

2. The coordination as far as possible of the various survey organizations throughout the Empire. The Topographical Section of the General Staff is in fact the only coordinating element for geographical purposes in the Empire. The D.A.Q.M.G. in charge of the section is a member of the recently formed Colonial Survey Committee which advises the Secretary of State for the Colonies on all matters connected with the surveys of the British Colonies and Protectorates in Tropical Africa.

3. All correspondence on technical matters between the War Office and the Ordnance Survey, and on geographical matters between the War Office and the Intelligence Branch, Simla, and the War Office and the Survey of India, through the Intelligence Branch, Simla.

4. The section advises the Foreign Office and the Colonial Office on all geographical questions, especially those connected with International Boundaries.

5. All questions relating to the appointment of Army Officers to geographical duties and the control of the Colonial Survey Section.

6. In war it has been decided that officers from the Topographical Section, or who have served in the section, will be appointed Staff Officers to organize and direct the topographical work at the seat of war under the Chief of the Staff.

7. The drawing and printing of maps and charts for defence schemes.

8. Minor duties, such as the preparation of maps for handbooks and military reports.

## F R A N C E.

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In France there is no central department dealing with the survey of France, her Colonies and Dependencies; the work being divided among several distinct and independent organizations, both in France and the Colonies. The only co-ordinating element, it can scarcely be called an authority, is a committee which meets from time to time at the War Office in Paris.

The principal geographical establishment in France is the Service Géographique de l'Armée, which is a branch of the General Staff of the Army. This department executes all geodetic work in France, Algeria, and Tunis, and is further responsible for the survey, reproduction and issue of all topographical maps of those countries. Cadastral and other large scale maps are executed by the department requiring them; each Department of State which has need of maps and plans for carrying out its work being provided with a section for executing such work.

Indo-China, Madagascar, and the West African Colonies have each their own geographical services; that of Indo-China being entirely self-contained, training its own staff, and reproducing and printing its own maps; the Madagascar and West African Services both send their maps to Paris for reproduction.

To coordinate the geographical and topographical work carried out by the different government departments, a Central Committee was instituted by a Ministerial decree, dated June 10, 1901; the object of this committee is thus set out in the letter of the Président du Conseil to the President of the Republic.

Article 50, of the Annual Finance Bill for 1901 provides for the creation at the War Office of a Comité Central des Travaux Géographiques. This committee will serve to connect the different departments which have geographical and topographical sections, and will centralize the work to prevent duplication.

The various departments concerned have agreed to the establishment of a committee of 20 members, in which each department will be represented according to the importance of its geographical section, and the presidency of the committee will be reserved for the Chief of the General Staff of the Army on account of the paramount importance among French geographical undertakings of those which concern the defence of the country.

This decree sets forth the duties of the committee as follows :—

1. To review all projected undertakings which necessitate the execution of surveys and maps at Government expense.
2. To decide on their value and urgency.
3. To avoid duplication.
4. To study the best methods of reproduction, and to superintend the revision of maps.
5. To direct the efforts of all branches of the Public Service towards completing geographical knowledge of France and her Colonies.

The 20 members of this committee are thus distributed :—

War Office...	...	...	...	...	...	5
Foreign Office	...	...	...	...	...	1
Home Office	..	...	...	...	...	2
Treasury	...	...	...	...	...	1
Admiralty	...	...	...	...	...	4
Education Department	...	...	...	...	...	1
Public Works	...	...	...	...	...	2
Commerce and Industry	...	...	...	...	...	1
Agriculture (including Forest Department)	...	...	...	...	...	1
Colonial Office	...	...	...	...	...	1
Post and Telegraph Department	...	...	...	...	...	1

This committee, as is evident from its composition, is intended to deal chiefly with the work of the various geographical sections at home, and takes little cognisance of the work being carried out by the Colonial Services.

### The "Service Géographique de l'Armée."

The Service Géographique de l'Armée, formerly the Dépôt de la Guerre, was first formed in 1688, and has been in continuous existence since that time. It is to-day a branch of the General Staff, and is directly under the Chief of the General Staff. The officers of the Service are selected from all branches of the army, and service in the department is equivalent to service in any other branch of the General Staff.

The immediate chief of the department is a General Officer, who is one of the "sous-chefs" of the General Staff; under him the department is organised in four executive sections and an accounts branch. The sections are as follows:—

- I. Section de Géodésie.
- II. Section des Levés de Précision.
- III. Section de Topographie.
- IV. Section de Cartographie.
- V. Section de Comptabilité.

The duties of the Service may be summarized as follows:—

1. Execution of geodetic work in France, Algeria, and Tunis.
2. Execution of topographical surveys in France, Algeria, and Tunis.
3. Preparation and issue of maps for war.
4. Preparation of manœuvre maps.
5. Collection and record of geographical information.
6. Preparation of maps of foreign countries.
7. Special work of scientific interest, as the measurement of an arc of meridian now in progress in South America.

The headquarters of the Service are located in Paris (Rue de Grenelle), in the buildings formerly occupied by the Ecole de Guerre, and consist of offices, drawing establishment, photographic establishment, printing establishment, and store rooms for mobilization maps. The buildings not having been designed for the purpose to which they are now devoted are inconvenient, and the whole equipment compares very unfavourably with that of the Ordnance Survey at Southampton; the maps produced are however excellent, though the annual output is small.

The work and personnel of the various sections is as follows:—

#### GEODETIC SECTION.

The normal work of the Geodetic Section consists in—

1. Executing any triangulation required in France.
2. Executing the triangulation in Tunis and Algeria for the surveys in progress in those countries.
3. Special geodetic work, often of scientific interest only.

At present the chief work of the section is the execution of a new primary and secondary triangulation of France upon which to base the ~~1:100,000~~ map. The primary triangulation which forms the frame-work of the ~~1:100,000~~ map of France, or Carte d'Etat-Major, hitherto the standard map of the country, was completed in 1845; and the secondary work for the same map in 1854. In view of the larger scale of the new map, and the higher degree of accuracy which modern instruments permit, it was considered desirable to execute an entirely new triangulation, both primary and secondary, disregarding altogether that completed in 1854. This work, which has now been in progress for several years, is expected to occupy 20 years and to necessitate an annual outlay of 100,000 francs (£4,000), or a total expenditure of 2,000,000 francs (£80,000). This charge is to be borne by the War Department and the Finance Department in equal shares.

In Algeria and Tunis the geodetic frame-work for the maps of those countries is almost completed.

A small party is employed in Algeria making observations with a view to determining the cause of certain differences in the positions of various points as determined geodetically and as found by astronomical observation.

In South America a party consisting of four officers and a doctor is engaged in measuring an arc of meridian near Quito. work which has no connection with military mapping, but is of great scientific interest.

At the end of 1904, the latest date for which figures are available, the staff of the section was as follows:—

- 1 Lieut.-Colonel, Chief of the Section.
- 2 Chefs de Bataillon.
- 13 Captains.

A total of 16 Officers ; in addition to this permanent staff there were five Captains and one Lieutenant of the Colonial Army attached for instructional purposes, and also the party consisting of four Captains and a Doctor employed in South America.

The Officers of the geodetic section are not necessarily drawn from the scientific branches of the army, but Officers who have passed through the Ecole Polytechnique, or who have been prepared for that school, are preferred.

The subordinate staff consists of:—

- 2 Mechanicians.
- 2 Calculators
- 2 Clerks.

Attached to the Section is a school for training the personnel in their technical duties.

#### SECTION DES LEVÉS DE PRÉCISION.

The original work of this Section was the execution of large scale topographical surveys of the environs of fortresses and other places of military importance; when it was decided to make a new map of the whole of France on a scale of  $\frac{1}{100,000}$ , the

scope of the work was extended, and to-day the Section is engaged in mapping the whole of France on scales of  $\frac{1}{50000}$  and  $\frac{1}{25000}$  for the preparation of the new map.

Before the extension of the work mentioned above, the field work was entirely carried out by Officers; since 1902 "Sous-Officers" have been employed as well, with very satisfactory results.

The personnel of the Section is composed of:—

I. Permanent Staff.

II. Officers and N.C.Os. from the active army who are attached to the Section for a certain number of months each year for field work.

In 1904 the permanent staff consisted of:—

1 Lieut.-Colonel, Chief of the Section.

1 Chef de Bataillon.

3 Captains.

All these were Officers of Engineers.

In addition to the permanent staff of Officers there are a number of officials termed "Officiers d'Administration," who are civilians but rank as Officers. In 1904 there were 25 of these in the Section.

The subordinate staff consisted of:—

2 Non-commissioned Officers.

12 Draughtsmen.

1 Map-colourer.

1 Modeller (for relief maps)

1 Mechanician.

1 Instrument Repairer.

2 Carpenters.

The temporary staff employed in 1904 comprised 19 Officers (1 Captain and 18 Lieutenants) and 32 Non-commissioned Officers

### FIELD STAFF.

The staff employed in the field is organized in "Brigades," of which two, the Brigade Topographique de Cherbourg, and the Brigade Topographique d'Alger-Les Alpes, are composed of Officers, and have the following staff:—

#### Permanent Staff—

2 Captains.

14 Officers d'Administration.

14 Non-commissioned Officers.

#### Temporary Staff—

1 Captain.

28 Lieutenants.

The attached Officers are selected from all branches of the service, and are appointed annually for the work of the season. The system of selection and training is as follows:—The names of likely Officers, and specimens of their work, are submitted by their Commanding Officers to the Chief of the Service Géographique, and from among the names so submitted the number required are selected. An Officer is first employed at work on a scale of  $\frac{1}{10000}$ ; and selections are made from Officers with experience of this work for employment on smaller scale surveys.

These Brigades of Officers are employed on work in the vicinity of "Places Fortes" in France and Algeria, and on work in the Alps.

The Non-commissioned Officers are organized in 4 Brigades of 8 each, an official is placed in charge of each Brigade and the whole group is commanded by a Captain; the method of selection is as follows:—Lists of suitable men are forwarded by each Army-Corps Commander, from these a certain number of men are selected and ordered to Paris, where they are tested in drawing in the school attached to the Service, and in work in the field during a period of 25 days; from these the number required are chosen by merit.

To assist these Brigades of N.C.Os. there is a small section termed Topographes Préparateurs, consisting of:—

2 Officiers d'Administration of the 2nd Class.

2 Officiers d'Administration of the 3rd Class.

1 Non-commissioned Officer.

The duty of this section is to lay off on the plane-table sheets the fixed points for the N.C.O. topographers to work from.

The method employed in the field is that of plane tabling, the instrument used being provided with an elaborate form of telescopic alidade fitted with level and vertical arc. Distances under 600 metres are measured by means of a subtense rod.

When the season's work is finished the Brigades return to Paris, where margins are compared and field sections finished; the attached Officers then return to their units. The fair drawings are prepared under the superintendence of the Chef de Brigade.

#### OFFICE STAFF.—

The office work of the section consists of:—

- I. Administrative work.
- II. Preparation of "fair drawings" of field work for the Cartographical Section to work from.
- III. Modelling of Relief Maps.
- IV. Buying, testing and repair of the instruments required by the Section.

For the administrative work the Chief of the Section is assisted by one Officer, a Chef de Bataillon, and one Officier d'Administration of the 1st Class.

The Drawing Office is in charge of an Officier d'Administration of the 2nd Class. The drawing staff comprises nine draughtsmen and one map-colourer.

The Instrument Store is in charge of an Officier d'Administration of the 1st Class, who has under him an instrument repairer, a fitter, and a carpenter; the latter also acts as store-keeper.

This sub-section buys, tests, and distributes all instruments required by the section, and surveying instruments for the Corps of Engineers ; it also carries out repairs as far as the small staff at its disposal permits.

During the season of 1904 the extent of country mapped was as follows :—

In France—

On the  $\frac{1}{10000}$  scale 153,100 hectares, equal to 597 square miles.

On the  $\frac{1}{50000}$  scale 31,300 hectares, equal to 121 square miles.

In Algeria—

On the  $\frac{1}{10000}$  scale 11,250 hectares, equal to 67 square miles.

#### SECTION DE TOPOGRAPHIE.

The Section de Topographie is charged with the execution of the topographical surveys of Algeria and Tunis, and with the revision of the existing maps of France.

The organization of this section is similar to that of the Section des Levés de Précision as far as field work is concerned, but with the exception of the "Chef de la Section" it has no staff permanently employed at Headquarters.

In 1904 the permanent staff of the Section was as follows :—

1 Colonel, Chief of the Section.

On Revision of maps in France—

1 Chef de Bataillon, Chief of the Brigades employed on revision work.

2 Captains in charge of the 1st and 3rd Revision Brigades respectively.

On Topographic Surveys in Algeria and Tunis—

1 Chef de Bataillon, Chief of the Brigades.

6 Captains in charge of the 6 Brigades.

Six Officers of the Colonial Army were attached to the Section during the same period for instruction purposes.

The staff of Officers temporarily employed during the season of 1904 consisted of 2 Captains and 30 Lieutenants. No Non-commissioned Officers are employed on topographical work in this Section, but each Officer topographer employed in Algeria and Tunis has, to assist him generally, four soldiers.

The total staff of the Section in 1904 was :—

1 Colonel  
2 Chefs de Bataillon  
8 Captains } Permanent Staff.

4 Captains      }  
3 Lieutenants    } Under Instruction.

2 Captains      } Employed as topographers during part of  
30 Lieutenants    } the year, returning to their units for the  
                    } remainder.

These Officers are organized in Brigades, distributed as follows :—

## I. Revision of Work in France.

Three Brigades, comprising four permanent Officers, and  
25 Officers temporarily attached.

## II. In Algeria and Tunis.

**Six Brigades, comprising seven permanent Officers, and 31 Officers temporarily attached.**

The attached Officers are selected in the same manner as in the case of those employed on the Levés de Précision. Officers are usually employed at first with one of the Brigades working in France, as the field work there is executed on a larger scale than in Algeria and Tunis; and those who show special aptitude when working on scales of  $\frac{1}{5000}$  and  $\frac{1}{2500}$  are selected for the Brigades employed in Africa where most of the field work is on a scale of  $\frac{1}{10000}$ .

The system followed in apportioning the work is to give each Brigade one sheet of the map to survey during the season of about five months. The number of Officers in a Brigade being varied from year to year according to the amount of work in the sheet to be done; the sheet is further divided among the

individual Officers so that each will have about the same amount of work. At the beginning of each season all the Officers of a Brigade are assembled at Paris to plot the fixed points on their plane table sheets, and prepare generally for the field. The form of plane table used is similar to that already described. Each Officer executes, besides his original field section, three traces of his work ; one for colour washes, a second for the lettering, no names being entered on the original ; and the third for noting the geological formations ; this third trace is not used in the compilation of the published sheets, but is reduced and printed with a general report of the country which is not available to the public ; the practice of making these geological sheets was introduced by Colonel Remieux, who considered that such work tends to greatly improve an officer's eye for country, and further the information so obtained is very useful to the geological department.

During the field season the Chief of the Brigade is constantly visiting his Officers, and consequently acquires an intimate knowledge of the portion of the country his Brigade is engaged in surveying.

When the survey of the sheet is finished, the Chef de Brigade and his Officers return to Paris, where margins are compared and the field sections finished ; the Chef de Brigade also prepares two combined traces of the whole sheet, one to show routes and communications correctly classified, and the other the lettering. This work usually occupies a week or ten days, after which the Attached Officers revert to regimental duty. The Chef de Brigade during the winter supervises the preparation of the ~~maps~~ and ~~maps~~ maps ; the generalization required for the latter being considered a most important part of his duty.

The system in force in this Section and in that of the Levés de Précision of employing regimental officers, temporarily attached during a portion of the year, for the topographical surveying, undoubtedly has many advantages, both from the point of view of the Army itself, and that of the Service Géographique. A large number of Officers and N.C.Os. become trained in topographical surveying, thus automatically creating a large

reserve of fairly skilled topographers, and these topographers, moreover, are where they will be required in the event of active operations, *i.e.*, with the units of the Army. Secondly, a large number of Officers and N.C.Os. obtain an intimate knowledge of different parts of the country, and acquire an "eye for country" which no amount of field exercises could give them. Finally the competition amongst both Officers and N.C.Os. to obtain appointments on the Topographical Brigades stimulates a large number to improve their topographical knowledge and acquire skill in surveying.

From the point of view of the Service Géographique the system enables a large field staff to be employed during the part of the year most suitable for field work without incurring the expense of such a staff during the remainder of the year. Uniformity in the results is secured by the constant supervision of the permanent Officers of the Service who command the Brigades and groups of Brigades.

#### SECTION DE CARTOGRAPHIE.

This Section is charged with drawing, reproducing, and printing, all maps issued by the Service Géographique. There is in addition a printing office in the Section where any work required by the General Staff is done, and a school for training draughtsmen.

The staff of the Section is both military and civil, the superior staff being entirely military, while the subordinate staff is partly military and partly civil.

The superior staff is as follows:—

- 1 Chef de Bataillon, Chief of the Section.
- 1 Chef de Bataillon, Chief of the Engraving Sub-Section.
- 1 Chef de Bataillon, Chief of the Drawing Sub-Section.
- 1 Chef de Bataillon, Chief of the Reproduction and Printing Sub-Section.
- 1 Captain, Director of the School of Topographical Draughtsmen.

1 Captain, Assistant to the Chief of the Section.

4 Captains, employed on maps of France, Algeria, and Tunis.

On the compilation of maps of foreign countries the following officers are employed :—

1 Chef de Bataillon, in charge of the Sub-section.

5 Captains.

1 Lieutenant.

The subordinate staff of the Section is allocated as follows :—

Engraving Sub-Section	...	...	...	...	60
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Drawing Sub-Section...	...	...	...	...	44
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Reproduction and Printing Sub-Section ...	...	...	...	87
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Attached to the Cartographic Section is a small section which deals with the provision of maps on mobilization, the personnel of which is—

1 Chef de Bataillon.

1 Captain

The maps required on mobilization are stored at the Service Géographique.

#### SYSTEMS OF REPRODUCTION.

No new maps are now engraved on copper. The only copper engraving done being that necessary to keep existing maps up to date. Most of the maps, including the new ~~maps~~ are reproduced by helio-gravure; a few, however, are engraved on zinc.

The material received by the Cartographic Section from the Surveying Sections is :—

- (i.) The actual field sections on millboards, these are known as "les mappes."
- (ii.) The tracing of each section, showing the lettering and colour washes.
- (iii.) A combined tracing of the sections, showing more especially the routes and communications, with their classification.
- (iv.) A combined tracing of the sections showing all lettering and its classification.

The first two of these are prepared by the surveyors in the field, (iii.) and (iv.) by the Chef de Brigade in the bureau at the end of the season's work.

The draughtsman draws the projection, margins, and trigonometrical points, on a sheet of paper and then pricks them through on to a piece of Bristol board, or paper mounted on zinc; the object in using Bristol board or zinc mounted paper is to avoid distortion from the shrinkage of the paper, the detail being then transferred to this sheet, which is termed the "feuille de dessin." This "feuille de dessin" is drawn on a scale of  $\frac{1}{20000}$  when the scale of the map is to be  $\frac{1}{50000}$ ; when finished it is a complete outline map in black without contours; all the writing is done by hand, no typing being used.

The "feuille de dessin" is then reduced by photography to  $\frac{1}{50000}$ , and from the negative as many glass positives are made as there are to be colours in the map; from each positive all detail is then scraped away, except that which is to appear in the colour which that plate represents. Formerly the system of "duffing out" on the negative was employed, this has, however, been given up as the process described above is found to be more satisfactory; from these positives the zinc plates are prepared in the ordinary way.

**CONTOUR PLATE.**—The method followed in preparing the contour plate is different, and is as follows. A glass plate is coated with a white paste composed of:—

Gum Arabic	...	...	...	...	1 part
Carbonate of Lead	...	...	...	...	9 parts

Water—sufficient to make a thin paste.

When the plate is dry a faint blue impression of the outline is put on the white coating to serve as a guide in drawing the contours. The contours are drawn on the plate from photographic reductions of the field sheets, the draughtsman then goes over the lines with a steel point, a blunter point being used for the accentuated contours; the result is a beautifully fine clean-cut line. The plate is then blackened by exposure to sulphuretted hydrogen, and afterwards varnished with negative

varnish. The finished plate has the appearance and qualities of a very good negative, the lines being clear and the background opaque. A glass positive is obtained by contact printing from this contour plate, and from the positive the zinc plate is prepared.

**HILL SHADING.**—For the preparation of the hill shading plate a transfer of the contour plate is made on a sheet prepared by mounting two layers of paper on zinc; a brush drawing is then made, the contours furnishing the guide for the shading. From this hill plate termed the "model" a negative is made and from this in turn a glass positive is made by photographing the negative through a screen (150 lines to the inch); this positive is afterwards treated with acid to wash away the lines of the screen from the high lights and tone off the edges of the shadows. From the finished positive the zinc plate is prepared. For the new ~~map~~ map of France two hill plates are made, one drawn with an oblique light and the other with a vertical light, these are superimposed on the map, being printed in different colours. In other maps, Algeria, Tunis, etc., only one plate, drawn with an oblique light, is used.

For printing purposes duplicate plates are made by transferring from the originals.

Some of the Algerian maps are engraved on zinc. In this method the plate is covered with a black varnish and the outline drawn with a steel point, the varnish is then washed off and the plate rolled up and inked in the ordinary way.

#### PRINTING DEPARTMENT.

The Map Printing Department of the Service Géographique is not well equipped; it is established in the old riding school of the Ecole de Guerre; the machine presses, of which there are four, are old fashioned, each press being capable of but 400 impressions per hour under ordinary conditions, though this rate could probably be somewhat increased if necessary.

### SECTION DE COMPTABILITÉ.

This Section is divided into two branches :—

I. Accounts Branch.

1 Official.

2 Clerks.

II. Map Storeroom.

2 Clerks.

1 Office Keeper.

The duties of I. are purely financial ; II. is charged with the receipt, issue, and store of maps.

The annual cost of the Service Géographique de l'Armée is about £60,000.

The Geographical Service of Indo-China costs about £30,000 per year ; while the expenditure on the Survey of Madagascar is about £7,000 annually.

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## GERMANY.

### The Survey Section of the Great General Staff.

The German Survey Department is a branch of the Great General Staff, and is directly under the Chief of the Staff. At present the head of the branch is one of the four Quarter-master-Generals, though this is not necessarily the case.

The Chief of the Survey has an Adjutant, and is further assisted by the following Officers of the Great General Staff:—

1 Major-General,

1 Colonel,

2 Majors,

13 Captains,

a total of 17 General Staff Officers.

In addition to these there are 41 attached Officers, distributed among the three sections into which the department is divided.

#### TRAINING OF OFFICERS OF THE SECTION.

The Officers of the Section are selected from those Officers who show most aptitude for topographical work during their course at the Staff College (Kriegs Akademie). Those who distinguish themselves in topography being put in a so-called "T" class, and undergoing a special examination, according to the result of which officers are selected for attachment to the General Staff for a period of one to three years.

The higher ranks of the department are recruited from among those Officers who have already served in the department, and also by selecting Officers throughout the service, according to their capacity, and the requirements of the office they are to fill.

#### STRENGTH OF THE CIVIL PERSONNEL.

The civil personnel of the department is as follows :—

- 1 Map Room Inspector.
- 8 Directors of Survey.
- 125 Surveyors and Draughtsmen.
- 31 Assistant Surveyors and Draughtsmen.
- 3 Technical Inspectors.
- 1 Superintendent of Printing.
- 1 Chief Photographer.
- 32 Engravers, Lithographers, and Photographers.
- 13 Assistant Engravers, Lithographers, and Photographers.
- 15 Printers and Zinc workers.
- 14 Assistant Printers and Zinc workers.
- 20 Clerks and Secretaries.
- 4 Assistant Clerks and Secretaries.
- 7 Technical Assistants.
- 17 Messengers, Porters, etc.
- A total of 292.

#### TRAINING OF SUBORDINATES.

A few of the so-called civilian surveyors and draughtsmen employed in the Topographical Section of the department are N.-C. Officers of all arms who have been specially trained. The training these men undergo is as follows :—

A one year's course of instruction at the Pyrotechnic School (Oberfeuerwerker Schule) in drawing, the elements of the theodolite, and plane table work. Those who show most proficiency during this year's course are attached to the Topographical Section (the rest being returned to duty with their units), where they undergo further training for three years, as draughtsmen, surveyors, &c. If after this four years' training they prove satisfactory the candidates are permitted to leave the army, and are engaged as civil officials (Zivilbeamte).

The genuine civil officials of the department, printers, draughtsmen, clerks, &c., undergo no special training, being obtained as required in the open market.

The subordinate officials of the Cartographical Section must as a rule have passed the examination, qualifying them for service as "one year volunteers," but need not have done their service; practically they are all brought in from outside, efficient artisans being taken, irrespective of where they have received their training. The establishment of a school for training the personnel of this section is contemplated, but as yet the scheme has not been carried out.

#### **ORGANIZATION OF THE DEPARTMENT IN THREE SECTIONS.**

The Survey Department is divided into three sections, viz. :—

1. Trigonometrical Section.
2. Topographical Section.
3. Cartographical Section, and Map Room.

The duties, organization and strength of each of these are as follows :—

#### **Trigonometrical Section.**

The duty of the Trigonometrical Section is, as its name implies, to construct the trigonometrical framework on which the topographical work hangs. The whole country is covered with a network of triangulation, ten stations being fixed in each German square mile (1 German square mile equals 21·9 English square miles), each station being marked by a stone pillar. In addition to these stations the position of other suitable objects is fixed trigonometrically, and the heights of all fixed stations are determined.

The personnel of the Trigonometrical Section is as follows :—

1 Chief of Section	} Officers of the General Staff.
6 Directors	

1 Director (civil official).

6 Attached Officers (Captains and Lieutenants).

26 Surveyors and Assistant Surveyors.

A total of 40.

The section is divided into five sub-sections.

### Topographical Section.

The Topographical Section is responsible for the topographical detail of the maps, for correcting existing maps, and for the preparation of the sheets from which the Cartographical Section work. The personnel of the section is as follows :--

- 1 Chief of Section (a Major)                          } Officers of the
- 6 Directors of Survey (Majors and Captains)    } General Staff.
- 25 Attached Officers (Lieutenants) as Topographers.
- 79 Surveyors and Assistant Surveyors.
- 3 Survey Directors.
- 3 Registrars.
- A total of 117.

The section is sub-divided as follows :--

Registry (Office of the Chief of the Section).

Sub-sections	{ A B C D E F	}	For Topographical Survey (1 Director, 5 attached Officers, and 10 to 12 officials).
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" Sub-section G—For the custody of instruments, and for directing the Survey. (1 Director and three senior officials).

" H—For detailing Trigonometrical Points. (1 official in charge). This work is carried out by officials during the winter.

" I—For preparing reductions of the district surveys. (1 official in charge, with one or two officials as assistants). This work is carried out during the winter, a staff of girls being specially engaged to do it.

Enquiry Sub-section—For correcting existing maps. This sub-section is immediately under the Chief of the Section. The work is carried out by several senior officials.

## Cartographical Section.

The Cartographical Section is responsible for reproducing, printing and distributing all maps. This section also undertakes all drawing and printing for the General Staff.

### STAFF OF SECTION.

The personnel of the section consists of:—

- |                    |   |   |
|--------------------|---|---|
| 1 Chief of Section | { | Officers permanently attached to, but         |
| 2 Directors        |   | not actually belonging to, the General Staff. |
- 2 Directors (civil officials).
- 10 Attached Officers (Majors, Captains and Lieutenants).
- 5 Technical Inspectors, including 1 Superintendent of Printing, 1 Chief Photographer, and 143 Subordinates, Draughtsmen, Printers, etc. A total of 163.

### SUBDIVISION OF SECTION.

The Cartographical Section is divided into the following sub-sections :—

1. The  $\frac{1}{100000}$  map. "Reichskarte" (uncoloured).
2.  $\frac{1}{50000}$  Plane Table work.
3. Galvano-plastic (relief) and Photographic work.
4. Printing.
5. War maps. China, S.W. Africa, etc., and maps for European wars.
6.  $\frac{1}{100000}$  map (plain).
7.  $\frac{1}{100000}$  map (coloured).
8.  $\frac{1}{100000}$  map (coloured).
9. Fortress Plans. This sub-section is attached to and works under the Chief of the General Staff.

### MAP ROOM.

The Map Room is attached to the Cartographic Section ; but the Map Room Inspector is directly responsible to the Chief of the Department for the proper working of his sub-section,

### ISSUE OF MAPS IN PEACE.

The issue of maps both to the army, and to the public, except in so far as it is handed over to Messrs. Eisenschmidt, is carried out by the map room.

The issue of manœuvre maps (except for the Kaiser manœuvres), and maps of the environs of military stations, required for military purposes, is carried out by the Cartographical Section.

### ISSUE OF MAPS FOR ACTIVE SERVICE.

Subsection 5, called Die Verwaltung der Kriegs-Karten (Administration of War maps), is responsible for keeping the troops supplied with up-to-date maps for active operations. These maps are decentralized and kept at the headquarters, or even quarters of the units.

### GEODETIC AND GEOLOGICAL WORK.

Geodetic and Geological work is carried out by civil departments; the former by the Geodetic Institute, which is under the direction of the Ministry for Spiritual, Educational and Medical Affairs; the latter by the Royal Geological Land Institute, under the direction of the Ministry of Commerce, Industry and Public Works.

The Chief of the Staff is in close touch with both the above Institutes and arranges the yearly survey work in conjunction with them.

### ARRANGEMENT OF WORK.

At the commencement of each working year, the Chief of the General Staff gives out a so-called "Pensum" or task of about 200 square miles (German), i.e. about 4,380 square miles (English), of German territory, to be surveyed on a scale of  $\frac{1}{50000}$ . A survey on this scale, executed prior to 1873, exists, but is of course much out of date, and was not very accurate originally; moreover the conventional signs on it are not those now used.

The present task consists therefore in checking it, bringing it up to date, and drawing, reproducing, and issuing a revised edition of the map on a scale of  $\frac{1}{100000}$ . The Germans pride themselves on the accuracy of this new map.

The work is plane-tabled during the spring, summer, and autumn by the staff of the Topographical Section, who have the points fixed by the Trigonometrical Section to base their work on, and are further assisted by the old map. Although the task appears large, it works out to rather less than one English square mile per day per one officer and three assistants.

The original drawings prepared from the field sheets, together with photographic reductions which are prepared during the winter, are then sent to the Topographical Section for reproduction. The  $\frac{1}{100000}$  maps are engraved on copper, the  $\frac{1}{50000}$  drawn on stone; both would be engraved on copper could the necessary engravers be obtained. In Saxony, Baden, and Würtemburg both the  $\frac{1}{100000}$ , and the  $\frac{1}{50000}$  maps are engraved on copper. In Bavaria as in Prussia the  $\frac{1}{50000}$  is drawn on stone. 75 % of the maps published by the Department are printed by contract.

#### FIELD SURVEY SECTIONS.

The first attempt at an organized field survey section is now being made in S.W. Africa. A "Feldvermessungs" party consisting of—

- 1 Captain.
- 3 Officers for trigonometrical work.
- 1 Assistant triangulator.
- 6 Officers for topographical work.
- 2 Photographers.
- 2 Printers.

<sup>1</sup> was sent out there and has lately been reinforced by 2 officers and 60 men.

<sup>1</sup> During manœuvres the Cartographical Section provide at headquarters a small section for drawing and reproducing maps.

**SURVEY OF GERMAN COLONIES.**

The Survey Branch of the Great General Staff do not execute any survey work in the German Colonies, with the exception of Kiao Chou.

The survey work in all the other German Colonies is carried out by civilians under the control of the Colonial Section of the Foreign Office.

**COST OF SURVEY BRANCH.**

The annual cost of the Survey Section of the Great General Staff is about 1,250,000 marks (£62,500).

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## A'U S T R I A .

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### Imperial and Royal Military Geographical Institute.

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The Topographical Department of the Austrian Army, termed the Imperial and Royal Military Geographical Institute, forms part of the General Staff of the Army; it acts however as an independent whole and is possessed of general as well as special functions.

The Institute is at Vienna, and the personnel consists of Officers, military officials, and N.C. Officers and men, with an added civilian staff. The Officers belong partly to the General Staff and partly to the army at large, the latter returning to their respective commands after having served several years in the Institute, so as not to lose touch with their units.

The technical personnel are only taken exceptionally from civil life, being mostly former N.C. Officers, whose fitness for a given position in the Institute has been proven by long service and theoretical examination.

The organization and personnel of the department is as follows :—

The Director of the Institute is a Major-General who is assisted in the direction by :—

- 1 Colonel of the General Staff.
- 2 Officers.
- 12 Subordinates.

The executive portion of the Institute is divided into five sections, viz :—

1. Geodetic Section.
2. Topographical Section.
3. Cartographic Section.
4. Technical Section.
5. Administrative Section.

#### **GEODETIC SECTION :—**

This section is responsible for the execution of the geodetic framework of the maps of the Empire, including any astronomical work required ; and all levelling work. The chief of the Section is a Colonel (retired), who is assisted by two subordinates. Attached to the directorate of this section is a Naval Officer, whose duties are to supervise construction of charts.

The executive portion of the section is divided into three divisions, as follows :—

##### *Astronomical Division.*

1 Captain of Engineers, with a subordinate staff of three.

##### *Trigonometrical Division.*

1 Captain in charge  
9 Officers.  
8 Subordinates.

##### *Levelling Division.*

1 Captain in charge, with a subordinate staff of three N.-C. Officers.

#### **TOPOGRAPHICAL SECTION.**

This section is charged with the execution of the field work, and the preparation of the field sheets for the cartographical section.

The chief of the section is a Lieut.-Colonel (retired), who is assisted by three Officers.

The executive part of the section is divided into three divisions, and has attached to it a workshop for the repair of instruments. The divisions are as follows :—

*Construction Division.*

Major (retired) in charge, and one Officer, with a subordinate staff of 13.

The duties of this division are the preparation of the minor framework for the topographers.

*Topographical School.*

One Captain in charge and 15 Officers.

*Topographical Division.*

This division is sub-divided into five sub-divisions, each in charge of a Captain ; in addition to the Captains in charge of sub-divisions, the staff of the division comprises 33 Officers and six subordinates.

The workshop is in charge of a "Technical Official," who has a staff of three N.C. Officers and men.

**CARTOGRAPHICAL SECTION :—**

This section is responsible for the preparation of the finished maps, previous to reproduction by the Technical Section.

The chief of the section is a Colonel (retired), who is assisted by one Officer and one civilian subordinate.

The section is divided into the following four divisions :—

*Outline Drawing Division.*

1 Major (retired) in charge.

4 Officers.

61 Subordinates.

*Hill Drawing Division.*

1 Major (retired) in charge.

15 Officers.

19 Subordinates.

*Levelling Division.*

1 Lieut.-Colonel (retired) in charge.

8 Officers.

4 Subordinates.

*Archives Division.*

1 Captain (retired) in charge.

1 Officer.

4 Subordinates.

**TECHNICAL SECTION :—**

This section is charged with the reproduction and printing of the maps prepared in the Institute.

The chief of the section is a Colonel who is assisted by one Officer and four subordinates.

The section is sub-divided into six divisions, as follows :—

- (a) Photographic Division.
- (b) Helio-gravure Division.
- (c) Copper Engraving Division.
- (d) Lithographic Division.
- (e) Photo-Lithographic Division.
- (f) Printing Division.

The staff employed in these six divisions numbers 247.

**ADMINISTRATIVE SECTION :—**

This section is charged with the interior economy of the Institute.

The chief of the section is a Lieut.-Colonel (retired), and under him are four sub-divisions, viz. :—

Accounts Office.

Institute Pay Office.

Building Administration.

Staff Section.

The staff of these comprises one Officer (retired); three Pay-masters, and 40 subordinates.

The chief work of the Department is the preparation and issue of the ~~75000~~ map of Austria-Hungary.

The plane table sheets for this map are originally drawn to a scale of ~~1:6000~~, photographic reductions of these on a scale of ~~1:6000~~ are then made, these reductions, together with the original field sheets are sent to the Cartographical Branch, who prepare finished drawings on the same scale. The finished drawings when completed are handed over to the Technical Group where they are reproduced by photogravure. The ~~75000~~ map is reproduced in black only, and without contours, the features of the ground being shown by hachures. The field work of the ~~75000~~ map is said to cost approximately £80 per square mile.

The annual cost of the institute is about £32,000.

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## R U S S I A.

### Topographical Section of the General Staff.

The Russian Topographical Department, as is the case with most modern Russian Institutions, originated during the reign of Peter the Great. That Tsar established the office of Quartermaster-General and made it part of the duties of his department to collect all information with regard to topography and roads which the military service might require.

Under the immediate successors of Peter the Great, military topographical work was centered in the Engineer Department of the War College.

In 1763 the Empress Catherine II. established the General Staff, and during the latter part of the 18th century a number of military route maps were prepared by Officers of the General Staff.

In 1796 the Emperor Paul created the Imperial Office of Draughtsmen, converted in 1797 into an Imperial Depôt of Charts, and thus laid the foundation for the Topographical Division of the General Staff.

The Depôt of Charts was intended to serve not merely the army, but to form a complete State Depôt of maps and plans. The collection of maps accumulated in the Engineer Department and the office of the Quartermaster-General was transferred to the Depôt, which was placed under the immediate command of a Major of Engineers.

After the establishment of the Ministry of War in 1812 the Depôt of Charts was transferred to that ministry, and its designation altered to Military Topographical Depôt.

In 1816 the Military Topographical Depôt was placed under the Chief of the General Staff, and became, as it is to-day, an integral part of the General Staff.

As now organised the depôt has its own directory, the Director being a Lieutenant-General, and is charged with carrying out all Astronomic, Trigonometric, and Topographic work, and the reproduction and printing of all maps required by the army.

The department is divided into:—

- I. The Chancery.
- II. The Trigonometrical Section, including the Instrument Office.
- III. The Cartographic Section, which includes:—
  - (a) The Drawing and Colouring Division.
  - (b) The Engraving Branch.
  - (c) The Lithographic Branch.
  - (d) The Photographic Branch.
  - (e) The Printing Branch.
  - (f) The Bookbinding Branch.
- IV. The Military Topographic Depôt.
- V. The Map Selling Depôt.

The personnel at headquarters is composed of Officers, Officials, who may be either civil, or military, and rank with Officers, and subordinates, i.e., N.C.O.s., Clerks, Draughtsmen, Engravers, Printers, &c.

In 1903 the superior Staff at headquarters consisted of 10 Officers, 6 Officials, 134 Subordinates, 1 Serjeant and 21 Clerks attached, a total of 172 of all ranks.

The Officers are selected from those who have completed the course in the Geodetic Section of the Academy of the General Staff, and have then undergone a two years' practical course at the observatory at Pulkova.

The superior Staff is distributed as follows:—

1 Lieut.-General, Director.

#### CHANCERY.

1 Lieut. Colonel, 4 Officials.

#### TRIGONOMETRICAL SECTION.

1 Colonel.

2 Officers.

1 Official.

#### CARTOGRAPHICAL SECTION.

1 Colonel.

4 Other Officers.

1 Official.

For the actual survey work in the field there is a body of skilled surveyors termed the Corps of Military Topographers. The personnel of this Corps consists of Officers and Officials. In 1900 its strength was—

4 Generals.

43 Field Officers.

88 other Officers.

158 Officials.

A total of 293 of all ranks.

The Officers and Officials who form this Corps receive a special education at the Military Topographical School. In addition to the regular personnel of the Corps, Officers from the active army are attached for Topographical work, these attached Officers being selected from Volunteers who have successfully passed a special course at the Military Topographical School.

The Military Topographical Department only undertakes surveys required for military purposes, and occasionally work of purely scientific interest, cadastral and other maps, required for civil purposes only, being executed by the civil department con-

cerned. When employed in the theatre of war, the Military Topographers are formed not only in separate parties, but are also attached to the Staffs of the troops employed. During the Russo-Turkish War of 1877-78 upwards of 400 Topographers were employed with the army, and an excellent map of a large part of European Turkey on a scale of  $\frac{1}{150000}$  executed.

In the recent Russo-Japanese War a Military Topographical Department was formed in the 2nd Manchurian Army and attached to the staff of the Commander-in-Chief; it consisted of 69 of all ranks.

The principal topographical maps executed by the department are:—

The  $\frac{1}{150000}$  of European Russia, the field work for which is on scales of  $\frac{1}{21000}$  and  $\frac{1}{25000}$ .

A  $\frac{1}{100000}$  map of Finland and a special map of European Russia on a scale of  $\frac{1}{250000}$ .

Of Asia, the department has issued a military road map of Asiatic Russia, scale  $\frac{1}{600000}$ . A map of Asiatic Russia with neighbouring countries scale  $\frac{1}{2500000}$ .

The Caucasian and the Turkestan Military Staffs have their own Topographical Departments, the former at Tiflis, the latter at Tashkend, and execute and publish maps of the country within their military districts.

There is no information available as to the amount expended annually on the Topographical Section of the Russian General Staff.

## Comparison between the Geographical Services of Foreign Countries and of Great Britain.

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At first sight the disproportion between the strength of the Topographical Branches of European War Offices and that of the Topographical Section of the British General Staff is very striking; a numerical comparison, however, is misleading, as much of the work done by the Topographical Departments of the French, German, Austrian, and Russian War Offices, is in England carried out by the Ordnance Survey. In making any comparison therefore, the strength of the Ordnance Survey must be taken into consideration.

In 1905 the staff of the Ordnance Survey consisted of:—

23 Officers.

2 Warrant Officers.

366 N.-C. Officers and men.

1,630 Civil Assistants.

535 Labourers.

A portion of the Officers, and the N.-C. Officers and men, are organized into three Survey Companies, which form part of the Corps of Royal Engineers, and are available as Fortress Companies in war.

A considerable proportion of the civilians employed are men who have served in these Survey Companies.

Three complete "Survey Sections" each composed of 2 Officers and 12 N.-C. Officers and men of the Royal Engineers, fully equipped both for survey work, and for reproducing and printing maps, are held in readiness for service with an army in the field. Further, the whole plant, including 11 machine presses, of the large establishment of the Ordnance Survey at Southampton, is available for the production of military maps if required.

It will thus be seen that the survey staff available for service in the field during war, and the facilities at the command of the Topographical Section of the General Staff for reproducing and printing maps required for war, are very large, and should be sufficient to meet any probable demands.

Outside of Great Britain and Ireland, and the Dependency of India, the survey work of the empire is in a very backward state, but within the last two or three years steps have been taken which should ensure the eventual provision of good maps, sufficient to meet all military requirements, of Canada and most of the African colonies.

In Canada a Topographical Section forms part of the recently created Intelligence Branch at the Militia Headquarters. This section is now engaged in executing a survey on a scale of 1 inch to 1 mile. While the output of maps is at present small owing to the limited amount of money available annually, no doubt as the value of the work, not only for military, but for civil purposes becomes recognized, the present small section will be developed.

In Australia nothing is being done towards executing a Topographical survey of the country. In view of the vast extent of Australia and the small population, the commencement of a topographical survey, can hardly be expected for some years.

#### **BRITISH TROPICAL AFRICA.**

The surveys and explorations of the British Colonies and Protectorates in Tropical Africa have developed very largely within the last few years. Briefly the state of the work is as follows:—

*Gambia*.—With the work of the various Boundary Commissions, and material collected by officials of the Colony, very fair maps are now available.

*Sierra Leone*.—An accurate survey of the vicinity of Freetown, on a scale of 1" to 1 mile, has been executed. Maps of the remainder of the Colony have been compiled from the work of Boundary Commissions, and from route sketches.

*Gold Coast.*—An organized Survey Department has now been working in this Colony for about five years. Accurate surveys of the mining area have been made, and a net-work of rigorous traverses run throughout the south of the Colony and Ashanti. Of the Northern Territories the only maps available are compilations from boundary maps and sketches.

*Southern Nigeria.*—In this Protectorate which now embraces Lagos, regular surveys have been in progress for nearly five years, and fair maps of a considerable portion now exist. Under the new administration which combines both Lagos and Southern Nigeria, an amalgamated Survey Department is being formed, which will carry on a methodical survey of the country.

*Northern Nigeria.*—In this Protectorate no attempt has been made to start a rigorous survey, and it is unlikely that any such survey will be commenced for many years. During the last year a small party, formed by agreement between the Colonial Office and the War Office, has accurately fixed by latitudes, and telegraphic longitudes the position of fifteen points, distributed over the Protectorate; with the control furnished by these it will be possible to compile from route sketches, and other material, maps of sufficient accuracy to meet present requirements.

*British Central Africa.*—No systematic survey has been undertaken. In the South some rough plane table sketching is available, and in the North work executed by Boundary Commissions.

*British East Africa.*—A well organized Survey Department has been formed and a systematic survey of the Protectorate is in progress, chiefly confined for the present to trigonometrical and cadastral work.

*Uganda.*—A Survey Department exists, which has made some progress with a net-work of secondary triangles. As a result of three Boundary Commissions a fair

chain of triangles now extends from the Indian Ocean round the north of the Lake Victoria to Lake Albert Edward.

*Somaliland*.—The only maps of Somaliland, are those compiled from surveys executed during military expeditions in the country, and from the work of Boundary Commissions.

*Egyptian Sudan*.—An organized Survey Department has been in existence for several years, and excellent work is being done, though owing to the limited resources of the department and the vast area to be surveyed the progress of the work must necessarily be slow. At present cadastral surveys occupy most of the energies of the Department.

*South Africa*.—The five South African Colonies form the area of British Africa of which it is most important to have good maps. In the Cape Colony, Natal, the Orange River Colony, and the Transvaal, the geodetic framework has been completed, and arrangements have been concluded for completing the meridional chain of triangles already run through the greater part of Rhodesia.

In the Cape Colony a staff of twelve Officers is now engaged in executing reconnaissance surveys on a scale of four miles to one inch, this survey, while not of rigorous accuracy, should just fulfil the military requirements and can only be regarded as a temporary expedient.

In the Orange River Colony a Survey Section consisting of two Officers and four Non-Commissioned Officers is engaged in carrying out a topographical survey of the Colony.

In Natal, the Transvaal, and Rhodesia no topographical survey work has ever been carried out, and of these Colonies the only maps available are the untrustworthy ones compiled from farm surveys which proved of so little value during the Boer war.

Of the remaining parts of the empire few accurate maps exist. St. Helena, Bermuda, Mauritius, and Hong Kong have been accurately surveyed, but of the other colonies and dependencies only compilations from very rough material are available.

In view of the preponderance of British influence in Egypt, and its geographical situation, that country may be considered with British Africa. A highly organized Survey Department forms part of the Egyptian Administration, and rigorous surveys of the country have been executed. Within the next year the Department expect to publish 140 sheets of the ~~10000~~ map of Egypt. A beginning is also being made with the geodetic lines along the Nile.

Until the last year no central body to co-ordinate and advise upon the survey work in progress in the various Crown Colonies existed. Recently an advisory committee termed the Colonial Survey Committee has been formed. This committee, which meets from time to time at the Colonial Office, deals with all questions of survey work, in the Colonies administered by the Crown, which may be referred to it by the Secretary of State for Colonies; it consists of a representative of the Colonial Office, the Director General of the Ordnance Survey, and the Deputy Assistant Quartermaster-General in charge of the Topographical Section of the General Staff. Questions affecting surveys in self-governing colonies do not, of course, come within the province of the committee.

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